May 12, 1931. W. C. OSTERHOLM 1,805,255

VALVE TAPPET AND METHOD OF FORMING THE SAME

Original Filed April 21, 1924

Fig. 1.

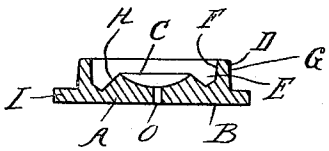


Fig. 2.

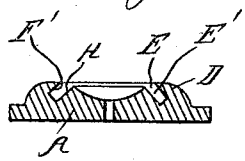


Fig. 3.

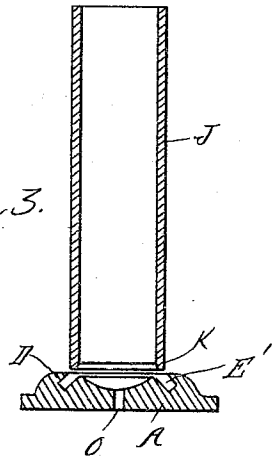


Fig. 4.

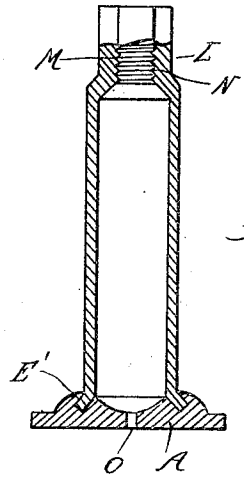
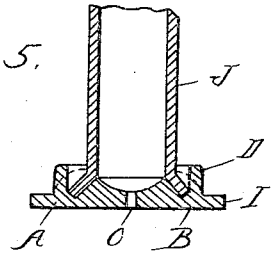


Fig. 5.



Inventor
William C. Osterholm
By Whittemore Hulbert
Whittemore & Belknap
Attorneys

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UNITED STATES PATENT OFFICE

WILLIAM C. OSTERHOLM, OF OAK PARK, ILLINOIS, ASSIGNOR TO WILCOX PRODUCTS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

VALVE TAPPET AND METHOD OF FORMING THE SAME

Original application filed April 21, 1924, Serial No. 708,048. Divided and this application filed December 27, 1926. Serial No. 157,347.

The invention relates to the manufacture of valves, valve tappets and the like wherein the head and stem are formed of separate members which are united to form a single structure having properties particularly adapting the same for use in internal combustion engines. The primary objects of the invention are to reduce the cost of manufacture and obtain a light and durable structure. This application is a division of my co-pending application, Serial No. 708,048, filed April 21, 1924.

In the drawings:

Figure 1 illustrates the head of a tappet as formed by casting, forging or pressing.

Figure 2 shows the head after a subsequent operation.

Figure 3 illustrates one method of uniting the head and stem.

Figure 4 represents the finished tappets.

Figure 5 illustrates a modified method of uniting the head and stem.

The head is formed in any suitable manner to provide the structure illustrated in Figure 2 and is preferably made from a suitable material which can subsequently be heat treated to form a hard wearing surface. The shape of the head is such that it can be manufactured at a very low cost as a product of a screw machine and it may either be machined directly from a round disk blank of metal or formed to the approximate shape by forging, stamping or casting operations.

Figure 1 shows a forging or casting having a flat bottom surface B. The upper surface of the blank has a cup shaped recess C in the central portion thereof and an annular flange D spaced from and surrounding the central portion forming an annular recess E therebetween. The flange D extends parallel to the axis of the blank and projects beyond the other portions of the head, the inner and outer surfaces F and G respectively being slightly tapered corresponding to the requirements for draft in a forging product. The inner boundary of the recess E is formed by the surface H which is substantially conical in form increasing in diameter from the central cup shaped portion toward the bottom of the recess. The head preferably, although not necessarily, is provided with a flange 1 of uniform thickness projecting radially outward beyond the flange D.

Figure 2 shows the head A as above described after the flange D has been pressed inwardly. The recess E is now bounded by the annular surfaces H and F′ which are substantially parallel forming a slot of uniform width extending into the head at an inclination to the axis of the same.

The stem J may be formed in various sizes but is preferably a tubular member having the lower end portion K of uniform diameter corresponding to the diameter of the entrance end of the annular slot E′ in the head A. The opposite end of the stem is shaped to conform with the particular requirements of the article and as shown is pressed or otherwise fashioned into a polygonal form as indicated at L to produce a wrench hold. Preferably a bore M of smaller diameter than the main portion of the tubular stem extends through the wrench hold portion L and this is threaded at N to receive the cooperating member of the valve mechanism.

In order to unite the head and stem into a single structure the tubular end K of the stem is inserted into the annular recess E′ and endwise pressure is exerted on the parts which results in the outward turning of the tubular end and the expanding of the diameter so that the tubular member is forced into the bottom of the recess E′. This forms a structure as illustrated in Figure 4, in which the stem and head are firmly united in interlocking engagement.

Another method of forming the tappet consists in applying endwise pressure to the stem member while it is in registration with the slot E in the blank shown in Figure 1, this method being illustrated in Figure 5. As a result the end of the tubular member is flared outwardly into conformity with the conical surface H while the annular flange D remains substantially parallel to the axis of the head. While the parts are engaged in this manner the flange D is then turned inwardly by applying inward pressure thereto, thus inclosing the flared end of the stem as shown in dotted lines in Figure 5.

The tappet or other similar article formed by either of the above methods is represented in its final form by Figure 4 and it is to be noted that the inter-locking engagement is obtained by a flaring tubular end being in engagement with a recess, the bounding walls of which are substantially parallel and oblique to the axis of the head. Where the product is to be used as a valve tappet, it is preferable to provide the head with a central bore O through which oil may be fed directly on to the cooperating cam.

What I claim as my invention is:

1. The method of manufacturing tappets and the like comprising the forming of a head with an annular recess therein bounded on the inner side by a conical surface, said head member having an annular flange extending substantially parallel to the axis of said head and forming the outer side of said recess, the forming of a separate tubular stem member, the end portion of which is of uniform diameter, applying endwise pressure to said head and stem to flare the end of said tubular member and conform the same to said conical surface, and pressing said annular flange inwardly to turn the same into such frictional inter-locking engagement with said flared tubular end as to prevent rotation of said head and stem.

2. A tappet or similar article comprising a head member having an annular recess therein bounded by an inner conical surface and an outer surface substantially parallel to said inner surface, and a tubular stem member having an end portion terminating in a conical outwardly flared portion, said flared portion being inserted in said annular recess into non-rotatable frictional interlocking engagement with the inner and outer surfaces of said recess.

3. A tappet comprising a head having a central cupped portion and an annular flange spaced from said central portion forming an annular recess inclined to the axis of said head and bounded by substantially parallel walls, a separate tubular stem member having an end portion terminating in an outwardly flared conical portion inserted in said annular recess and in non-rotatable frictional engagement with the parallel walls aforesaid and also in engagement with the bottom of said recess and an annular flange projecting radially outward in a direction transverse to the axis of said tappet, the lower surface of said head being substantially flat.

4. A tappet comprising a head member having an annular recess therein bounded by substantially parallel inner and outer surfaces, said recess extending into said head in a direction oblique to the axis thereof, said head being heat treated to form a hard wearing surface, and a separate tubular stem member having an end portion terminating in a conical flared portion inserted in said recess and in non-rotatable frictional interlocking engagement with said head.

5. A tappet comprising a head member having an annular recess therein bounded by substantially parallel inner and outer surfaces, said recess extending into said head, in a direction oblique to the axis thereof and terminating at one end at the surface of said head, and a separate tubular stem member having an end portion terminating in a conical flared portion inserted in said recess in non-rotatable frictional engagement with the parallel walls thereof and with the bottom of said recess.

6. The method of manufacturing a tappet which consists in forming a head with a recess therein bounded by inner and outer walls, forming a separate tubular stem member, the end portion of which is of uniform diameter, inserting the end of said stem member in said recess while flaring the same to cause the same to conform in shape to one wall of the recess, and bending the other wall of the said recess to cause the same to frictionally grip the flared end of the said stem member.

In testimony whereof I affix my signature.

WILLIAM C. OSTERHOLM.